IN THE CLAIMS:

The following listing of claims replaces any prior listing of claims.

1. (Original) A pressurizer for pressurizing a fluid, comprising:

at least two storage tanks, wherein, for each storage tank, said pressurizer further comprises:

a propellant entrance valve connected to and associated with said storage tank;

a propellant exit valve connected to and associated with said storage tank;

a pressurant entrance valve connected to and associated with said storage tank; and

a pressurant exit valve connected to and associated with said storage tank,

wherein each of said storage tanks is configured to be filled with said fluid under a low pressure when its associated propellant entrance and pressurant exit valves are open and its associated propellant exit and pressurant entrance valves are closed, and to be drained of said fluid under a high pressure by the force of a pressurant when its associated propellant entrance and pressurant exit valves are closed and its associated propellant exit and pressurant entrance valves are open,

wherein, for each storage tank, its associated valves are configured to be opened and closed in a cycle to sequentially fill and drain their associated storage tank of said fluid, said cycle having a cycle time,

wherein said cycles of said associated valves of said storage tanks are out of phase with each other such that at some time in which one storage tank is being filled with said fluid, at least one other storage tank is being drained of said fluid, and

wherein said cycle time for each storage tank is between 1 and 500 milliseconds.

2. – 3. (Canceled)

4. (Previously Presented) The pressurizer as in claim 1, wherein each of said associated valves of each of said storage tanks has an open time, which is the time required for the valve to move from a fully closed position to a fully open position, and a close time, which is the time required for the valve to move from a fully open position to a fully closed position, wherein, for each storage tank and its associated valves, a sum of the following terms is less than approximately 25 milliseconds: a) a maximum of the pressurant entrance valve open time and the propellant exit valve open time; b) a maximum of the pressurant entrance valve close time and the propellant exit valve close time; c) the pressurant exit valve open time; d) the propellant entrance valve open time; and e) a maximum of the pressurant exit valve close time and the propellant entrance valve close time.

5. (Canceled)

6. (Original) The pressurizer as in claim 1, wherein, for each storage tank, said associated pressurant exit valve comprises a plurality of separate flow holes and a movable valving member configured to restrict flow through said plurality of separate flow holes simultaneously.

7. (Original) The pressurizer as in claim 1, wherein, for each storage tank, said associated propellant exit valve comprises a plurality of separate flow holes.

8. (Original) The pressurizer as in claim 1, wherein said associated pressurant exit valve for each storage tank comprises at least one flow hole and a movable valving member configured to restrict flow through said flow hole, wherein a shortest flow distance from said movable valving member to a meniscus of said fluid inside said storage tank when said storage tank is fully filled with said fluid is substantially less than a shortest flow distance from said movable valving member to a meniscus of said fluid inside said storage tank when said storage tank is fully drained of said fluid.

9. (Previously Presented) The pressurizer as in claim 1, wherein said associated pressurant exit valve for each storage tank comprises at least one flow hole and a movable valving member configured to restrict flow through said flow hole, wherein each storage tank comprises a movable partition configured to substantially separate said fluid from said pressurant during filling and draining, wherein a shortest flow distance from said movable valving member to a surface of said movable partition when said storage tank is fully filled with said fluid is less than approximately one-tenth a shortest flow distance from said movable valving member to said movable partition when said storage tank is fully drained of said fluid.

10. (Original) The pressurizer as in claim 1, wherein said associated pressurant exit valve for each storage tank has a total flow cross sectional area that is at least one-tenth of a maximum cross sectional area of said storage tank in a direction perpendicular to a flow direction of said fluid inside said storage tank.

11. (Currently Amended) The pressurizer as in claim 1, wherein said associated pressurant exit valve for each storage tank comprises at least one flow hole and a movable valving member configured to restrict flow through said flow hole, wherein each storage tank comprises a movable partition configured to substantially separate said fluid from said pressurant during filling and draining, wherein a square root of a total flow cross sectional area of said associated pressurant exit valve is greater than ten times a shortest flow distance from said movable valving member to a surface of said movable partition when said storage tank is fully filled with said fluid.

12. (Canceled)

13. (Currently Amended) The pressurizer as in claim 1, wherein at least one of said associated propellant exit valve and said associated propellant entrance valve for each storage tank has a total flow cross sectional area that is at least one-fourth of a maximum cross sectional area of said storage tank in a direction perpendicular to a flow direction of said fluid inside said storage tank.

14. – 16. (Canceled)

17. (Currently Amended) An impulse reaction engine system, comprising:

an impulse reaction engine;

a propellant tank configured to contain propellant at a low pressure;

a gas generator configured to generate pressurant at a high pressure from liquid propellants; and

[[a]] the pressurizer as claimed in claim 1, the pressurizer configured to transfer propellant from said propellant tank at said low pressure to said impulse reaction engine at said high pressure in a substantially continuous flow, ~~said pressurizer comprising:~~

~~at least two storage tanks, wherein, for each storage tank, said pressurizer further comprises:~~

~~a propellant entrance valve associated with said storage tank and connected between said storage tank and said propellant tank;~~

~~a propellant exit valve associated with said storage tank and connected between said storage tank and said impulse reaction engine;~~

~~a pressurant entrance valve associated with said storage tank and connected between said storage tank and said gas generator; and~~

~~a pressurant exit valve connected to and associated with said storage tank,~~

~~wherein each of said storage tanks is configured to be filled with said fluid under said low pressure when its associated propellant entrance and pressurant exit valves are open and its associated propellant exit and pressurant entrance valves are closed, and to be drained of said fluid under said high pressure by the force of said pressurant when its associated propellant entrance and pressurant exit valves are closed and its associated propellant exit and pressurant entrance valves are open,~~

~~wherein, for each storage tank, its associated valves are configured to be opened and closed in a cycle to sequentially fill and drain their associated storage tank of said fluid, said cycle having a cycle time,~~

~~wherein said cycles of said associated valves of said storage tanks are out of phase with each other such that at some time in which one storage tank is being filled with said fluid, at least one other storage tank is being drained of said fluid,~~

~~wherein said cycle time for each storage tank is between 1 and 500 milliseconds, and~~

wherein at least one of a) and b) is true:

a) said associated pressurant exit valve for each storage tank comprises at least one flow hole and a movable valving member configured to restrict flow through said flow hole, wherein each storage tank comprises a movable partition configured to substantially separate said propellant from said pressurant during filling and draining, wherein a shortest flow distance from said movable valving member to a surface of said movable partition when said storage tank is fully filled with said propellant is substantially less than a shortest flow distance from said movable valving member to said movable partition when said storage tank is fully drained of said propellant; and

b) said associated pressurant exit valve for each storage tank has a total flow cross sectional area that is at least one-tenth of a maximum cross sectional area of said storage tank in a direction perpendicular to a flow direction of said propellant inside said storage tank.

18. - 20. (Canceled)

21. (Previously Presented) A pressurizer for pressurizing a fluid, comprising:
a storage tank;
an accumulator;
a propellant entrance valve connected to said storage tank;
a propellant exit valve connected between said storage tank and said accumulator;
a pressurant entrance valve connected to said storage tank; and

a pressurant exit valve connected to said storage tank,

wherein said storage tank is configured to be filled with said fluid under a low pressure when said propellant entrance and pressurant exit valves are open and said propellant exit and pressurant entrance valves are closed, and to be drained of said fluid under a high pressure by the force of a pressurant when said propellant entrance and pressurant exit valves are closed and said propellant exit and pressurant entrance valves are open,

wherein said valves are configured to be opened and closed in a cycle to sequentially fill and drain said storage tank of said fluid, said cycle having a cycle time,

wherein said accumulator is configured to provide a substantially continuous flow of said fluid at said high pressure by filling with said fluid when said storage tank is draining of said fluid, and by draining of said fluid when said storage tank is filling with said fluid,

wherein said cycle time is between 1 and 500 milliseconds, and

wherein at least one of a) and b) is true:

a) said pressurant exit valve comprises at least one flow hole and a movable valving member configured to restrict flow through said flow hole, wherein said storage tank comprises a movable partition configured to substantially separate said fluid from said pressurant during filling and draining, wherein a shortest flow distance from said movable valving member to a surface of said movable partition when said storage tank is fully filled with said fluid is substantially less than a shortest flow distance from said movable valving member to said movable partition when said storage tank is fully drained of said fluid; and

b) said pressurant exit valve has a total flow cross sectional area that is at least one-tenth of a maximum cross sectional area of said storage tank in a direction perpendicular to a flow direction of said fluid inside said storage tank.

22. - 24. (Canceled)

25. (Previously Presented) A pressurizer for pressurizing a fluid, comprising:

at least one pressure vessel;

a piston movable in said at least one pressure vessel;

at least two pressurant entrance valves configured to be opened and closed in a cycle and out of phase with each other;

at least two pressurant exit valves configured to be opened and closed in said cycle and out of phase with each other;

at least two propellant entrance valves configured to be opened and closed in said cycle and out of phase with each other; and

at least two propellant exit valves configured to be opened and closed in said cycle and out of phase with each other,

wherein said valves are connected to said at least one pressure vessel,

wherein said pressurizer is configured to be filled with said fluid under a low pressure and to be drained of said fluid under a high pressure by the force of a pressurant,

wherein said valves are configured to be opened and closed in said cycle to sequentially fill and drain said pressurizer of said fluid, said cycle having a cycle time,

wherein the pressurizer is configured to be filled with said fluid and drained of said fluid substantially simultaneously so as to deliver a substantially continuous flow of said fluid, and

wherein said cycle time is between 1 and 250 milliseconds.

26. (Previously Presented) The pressurizer as in claim 25, wherein the piston comprises at least two piston portions connected by a connecting rod, wherein at least one of said piston portions is reciprocatingly movable along a substantially linear segment, wherein at least one of said valves is located along said segment.

27. (Previously Presented) A rocket engine system, comprising:

an impulse reaction engine; and

the pressurizer as claimed in claim 26 connected to said impulse reaction engine,

wherein the piston comprises a differential piston, and

wherein the pressurant is generated at least in part by heat from the impulse reaction engine.

28. (Previously Presented) The pressurizer as in claim 25, wherein said at least one pressure vessel comprises at least two pressure vessels, and wherein said at least two propellant entrance valves and said two propellant exit valves are connected to a same pressure vessel of said at least two pressure vessels.

29. (Previously Presented) The pressurizer as in claim 25, wherein at least one of said pressurant exit valves has a total flow cross sectional area that is at least one-tenth of a maximum cross sectional area of said at least one pressure vessel in a direction perpendicular to a flow direction of said fluid inside said at least one pressure vessel.

30. (Previously Presented) The pressurizer as in claim 25, wherein the piston comprises at least two piston portions connected by a connecting rod,

wherein at least one of said piston portions is reciprocatingly movable along a substantially linear segment,

wherein at least one of said pressurant exit valves comprises at least one flow hole and a movable valving member configured to restrict flow through said flow hole, and

wherein a shortest flow distance from said movable valving member to a surface of said at least one of said piston portions when located at one end of said linear segment is less than approximately one-tenth a shortest flow distance from said movable valving member to said at least one of said piston portions when located at an opposite end of said linear segment.

31. (Previously Presented) The pressurizer as in claim 25, wherein the piston comprises at least two piston portions connected by a connecting rod,

wherein at least one of said piston portions is reciprocatingly movable along a substantially linear segment,

wherein at least one of said pressurant exit valves comprises at least one flow hole and a movable valving member configured to restrict flow through said flow hole, and

wherein a square root of a total flow cross sectional area of said at least one of said pressurant exit valves is substantially greater than a shortest flow distance from said movable valving member to a surface of said at least one of said piston portions when located at a proximal end of said linear segment.

32. (Previously Presented) The pressurizer as in claim 25, wherein at least one of said propellant exit valves and propellant entrance valves has a total flow cross sectional area that is at least one-fourth of a maximum cross sectional area of said at least one pressure vessel in a direction perpendicular to a flow direction of said fluid inside said at least one pressure vessel.

33. (Previously Presented) A rocket engine system, comprising:

an impulse reaction engine; and

the pressurizer as claimed in claim 32 connected to said impulse reaction engine,

wherein the piston comprises a differential piston,

wherein the pressurant is generated by the impulse reaction engine, and

wherein at least one of said pressurant exit valves has a total flow cross sectional area that is at least one-tenth of a maximum cross sectional area of said at least one pressure vessel in a direction perpendicular to a flow direction of said fluid inside said at least one pressure vessel.

34. (New) A pump for pumping a liquid fluid, comprising:

a pressurant entrance configured for introduction of a pressurant;

a pressurant exit configured for exit of the pressurant;

a fluid entrance configured for introduction of the fluid;

a fluid exit configured for exit of the fluid;

a first region connected to the fluid entrance and the pressurant exit; and

a second region connected to the pressurant entrance and the fluid exit,

wherein the first region is configured to fill with the fluid,

wherein the second region is configured to drain of the fluid by force of the pressurant while the first region fills with the fluid, and

wherein the first region has a first volume and the second region has a second volume different than the first volume.

35. (New) The pump as in claim 34,

wherein the first region comprises a first plurality of fluidly connected transfer chambers,

wherein the second region comprises a second plurality of fluidly connected transfer chambers,

wherein the transfer chambers are movable in a revolving cycle with respect to the first and second regions, and

wherein the pump is configured so that the first region is not configured to drain of the fluid and the second region is not configured to fill with the fluid.

36. (New) The pump as in claim 34, wherein the second region is generally located between boundaries of the first region.

37. (New) The pump as in claim 34, wherein the first region is generally located internally to a storage tank of the liquid fluid.

38. (New) A rocket system comprising:

the pump as claimed in claim 34;

a storage tank of the liquid fluid connected to the pump; and

a rocket engine connected to the pump,

wherein a ratio of the first volume to the second volume is in the range of approximately 3 to 14.

39. (New) The pump as in claim 34, wherein the first volume is at least approximately twice the second volume.

40. (New) The pump as in claim 34, wherein the pump is configured to pump a quantity of the fluid by the following process:

moving the quantity of the fluid into the pump in a first direction by force of a pressure on the fluid;

exposing the quantity of the fluid to a pressure of the pressurant;

moving the quantity of the fluid from the pump in a second direction substantially opposite the first direction by force of the pressure of the pressurant; and

venting pressurant to a pressure below the pressure on the fluid,

wherein the pressure of the pressurant is substantially greater than the pressure on the fluid.